AMERICAN BEE JOURNAL.

EDITED AND PUBLISHED BY SAMUEL WAGNER, WASHINGTON, D. C.

VOL. II. SEPTEMBER, 1866. No. 3.

The Hive Bees' Work.

The most profound philosopher, equally with the most incurious of mortals, is struck with astonishment on inspecting the interior of a *bee-hive*. He beholds a city in miniature. He sees this city divided into regular streets, these streets composed of houses constructed on the most exact geometrical principles and the most symmetrical plan, some serving for store-houses for food, others for the habitations of the citizens, and a few, much more extensive than the rest, destined for the palaces of the sovereign. He perceives that the substance of which the whole city is built is one which man, with all his skill, is unable to fabricate; and that the edifices in which it is employed are such as the most expert artist would find himself incompetent to erect. And the whole is the work of a society of insects! Nor have all its mysteries yet been fathomed. Philosophers have in all ages devoted their lives to the subject; from Aristomachus of Soli in Cilicia, who, we are told by Pliny, for fifty-eight years attended solely to bees, and Philiscus the Thracian, who spent his whole time in forests investigating their manners, to Swammerdam, Reaumur, Hunter, and Huber, of modern times. Still the construction of the combs of a bee-hive is a miracle which overwhelms our faculties.

You are probably aware that the hives with which we provide bees are not essential to their labors, and that they can equally form their city in the hollow of a tree or any other cavity. In whatever situation it is placed,, the general plan which they follow is the same. You have seen a honey-comb, and must have observed that it is a flattish cake, composed of a vast number of cells, for the most part hexagonal, regularly applied to each other's sides, and arranged in two strata or layers placed end to end. The interior of a bee-hive consists of several of these combs fixed to its upper part and sides, arranged *vertically* at a small distance from each other, so that the cells composing them are placed in a *horizontal* position, and have their openings in opposite directions—not the best position one would have thought for retaining a fluid like honey, yet the bees find no inconvenience on this score. The distance of the combs from each other is about half an inch, that is, sufficient to allow two bees busied upon the opposite cells to pass each other with facility. Besides these vacancies, which form the high roads of their community, the combs are here and there pierced with holes which serve as posterns for easy communication from one to the other without losing time by going round.

The arrangement of the combs is well adapted for its purpose, but it is the construction of the cells which is most admirable and astonishing. As these are formed of wax, a substance secreted by the bees in no great abundance, it is important that as little as possible of such a precious material should be consumed. Bees, therefore, in the formation of their cells have to solve a problem which would puzzle some geometers, namely, a quantity of wax being given, to form of it similar and equal cells of a determinate capacity, but of the largest size in proportion to the quantity of matter employed, and disposed in such a manner as to occupy in the hive the least possible space. Every part of this problem is practically solved by bees. If their cells had been cylindrical, which form seems best adapted to the shape of a bee, they could not have been applied to each other without leaving numberless superfluous vacuities. If the cells were made square or triangular, this last objection, indeed, would be removed; but besides that a greater quantity of wax would have been required, the shape would have been inconvenient to a cylindrical-bodied animal. All these difficulties are obviated by the adoption of hexagonal cells, which are admirably fitted to the form of the insect, at the same time that their sides apply to each other without the smallest vacant intervals. Another important saving in materials is gained by making a common base serve for two strata of cells. Much more wax as well as room would have been required, had the combs consisted of a single stratum only. But this is not all. The base of each cell is not an exact plane, but is usually composed of three rhomboidal or lozenge-shaped pieces, so as to form a pyramidal concavity

From this form it follows that the base of a cell on one side or stratum of the comb is composed of portions of the bases of *three* cells on the other. You will inquire, Where is the advantage of this arrangement? First, a greater degree of strength; and secondly, precisely the same as results from the hexagonal sides—a greater capacity with less expenditure of wax. Not only has this been indisputably ascertained, but that the angles of the base of the cell are exactly those which require the smallest quantity of wax. It is obvious that these angles might vary infinitely; but, by a very accurate admeasurement, Maraldi found that the great angles were in general 109° 28′, the smaller ones 70° 32′. Reaumur, ingeniously suspecting that the object of choosing these angles from amongst so many was to spare wax, proposed to M. König, a skilfull geometrician, who was ignorant of Maraldi's experiments, to determine by calculations what ought to be the angle of a hexagonal cell, with a pyramidal bottom formed of three similar and equal rhomboid plates, so that the least matter possible might enter into its construction. For the solution of this problem the geometrician had recourse to the infinitesimal calculus, and found that the great angles of the rhombs should be 109° 26′, and of the small angles 70° 34′. What a surprising agreement between the solution of the problem and the actual admeasurement!*

Besides the saving of wax effected by the form of the cells, the bees adopt another economical plan suited to the same end. They compose the bottoms and sides of wax of very great tenuity, not thicker than a sheet of writing-paper. But as walls of this thinness at the entrance would be perpetually injured by the ingress and egress of the workers, they prudently make the margin at the opening of each cell three or four times thicker than the walls. Dr. Barclay discovered that, though of such excessive tenuity, the sides and bottom of each cell are actually *double*, or, in other words, that each cell is a distinct, separate, and in some measure an independent structure, agglutinated only to the neighboring cells, and that when the agglutinating substance is destroyed, each cell may be entirely separated from the rest.

You must not imagine that all the cells of a hive are of precisely similar dimensions. As the society consists of three orders of insects differing in size, the cells which are to contain the larvæ of each proportionally differ, those built for the males being considerably larger than those which are intended for the workers. The abode of the larvæ of the queen bee differs still more. It is not only much larger than any of the rest, but of a quite different form, being shaped like a pear or Florence flask, and composed of a material much coarser than common wax, of which above one hundred times as much is used in its construction as of pure wax in that of a common cell. The situation, too, of these cells (for there are generally three or four, and sometimes many more, even up to thirty or forty in each hive) is very different from that of the common cells. Instead of being in a horizontal, they are placed in a vertical direction, with the mouth downwards, and are usually fixed to the lower edge of the combs, from which they irregularly project like stalactites from the roof of a cavern. The cells destined for the reception of honey and pollen differ from those which the larvæ of the males and workers inhabit only by being deeper, and thus more capacious; in fact, the very same cells are successively applied to both purposes. When the honey is collected in great abundance, and there is not time to construct fresh cells, the bees lengthen the honey cells by adding a rim to them.

You will be anxious to learn the process which these ingenious artificers follow in constructing their habitations; and on this head I am happy that the recent publication of a new edition of the celebrated Huber's *New Observations on Bees*, in which this subject is for the first time elucidated, will enable me to gratify your curiosity.

But in the first place you must be told of an important and unlooked for discovery of this unrivalled detector of the hidden mysteries of nature—that the workers, or neuters, as they are called, of a hive, consist of two descriptions of individuals, one of which he calls *abeilles nourrices*, or *petites abeilles*, the other *abeilles cirières*. The former, or *nurse bees*, are smaller than the latter; their stomach is not capable of such distension; and their office is to build the combs and cells after the foundation has been laid by the *cirières*, to collect honey, and to feed the larvæ. The *abeilles cirières* are the makers of wax, which substance Huber has now indisputably ascertained to be secreted, as John Hunter long ago suspected, beneath the ventral segments, from between which it is taken by the bees when wanted, in the form of thin scales. The apparatus in which the wax is secreted consists of four pair of membranous bags or *wax pockets*, situated at the base of each intermediate segment, one on each side, which can only be seen by pressing the abdomen so as to lengthen it, being usually concealed by the overlapping of the preceding segments. It should be observed that this discovery was nearly made by our countryman Thorley, who, in his *Female Monarchy* (1744), says that he has taken bees with six pieces of wax within the plaits of the abdomen, three on each side. In

*Father Boscovich observes, that all the angles that form the planes which compose the cell are equal, *i. e.* 120°; and he supposes that this equality of inclination facilitates much the construction of the cell, which may be a motive for preferring it, as well as economy. He shows that the bees do not economize the wax necessary for a flat bottom in the construction of every cell, near so much as MM. Konig and Reaumur thought.

MacLaurin says, that the difference of a cell with a pyramidal from one with a flat bottom, in which is comprised the economy of the bees, is equal to the fourth part of six triangles, which it would be necessary to add to the trapeziums, the faces of the cell, in order to make them right angles.

M. L'Hullier, professor of Geneva, values the economy of the bees at one fifty-one parts of the whole expense; and he shows that it might have been one fifth if the bees had no other circumstances to attend to: but he concludes, that if it is not very sensible in every cell, it may be considerable in the whole of a comb, on account of the mutual setting of the two opposite orders of cells. Huber, *Nouvelles Observations*, &c., ii. 34.

these pockets the wax is secreted by some unknown process from the food taken into the stomach, which in the wax-making bees is much larger than in the nurse-bees, and afterwards transpires through the membrane of the wax-pocket in thin laminæ. The nurse-bees, however, do secrete wax, but in very small quantities. When wax is not wanted in the hive, the wax-makers disgorge their honey into the cells.

The process of building a comb in a bee-hive, as observed by Huber, is as follows:

The wax-makers, having taken a due portion of honey or sugar, from either of which wax can be elaborated, suspend themselves to each other, the claws of the forelegs of the lowermost being attached to those of the hind pair of the uppermost, and form themselves into a cluster, the exterior layer of which looks like a kind of curtain. This cluster consists of a series of festoons or garlands, which cross each other in all directions, and in which most of the bees turn their backs upon the observer; the curtain has no other motion than what it receives from the interior layers, the fluctuations of which are communicated to it. All this time the *nurse-bees* preserve their wonted activity and pursue their usual employments. The wax-makers remain immovable for about twenty-four hours, during which period the formation of wax takes place, and thin laminæ of this material may be generally perceived under their abdomen. One of these bees is now seen to detach itself from one of the central garlands of the cluster, to make a way amongst its companions to the middle of the vault or top of the hive, and by turning itself round to form a kind of void, in which it can move itself freely. It then suspends itself to the center of the space, which it has cleared, the diameter of which is about an inch. It next seizes one of the laminæ of wax with a pincer formed by the posterior metatarsus and tibia, and drawing it from beneath the abdominal segment, one of the anterior legs takes it with its claws and carries it to the mouth. This leg holds the lamina with its claws vertically, the tongue rolled up serving for a support, and by elevating or depressing it at will, causes the whole of its circumference to be exposed to the action of the mandibles, so that the margin is soon gnawed into pieces, which drop as they are detached into the double cavity, bordered with hairs, of the mandibles. These fragments, pressed by others newly separated, fall on one side of the mouth, and issue from it in the form of a very narrow ribband. They are then presented to the tongue, which impregnates them with a frothy liquor like a *bouillie*. During this operation the tongue assumes all sorts of forms; sometimes it is flattened like a spatula; then like a trowel, which applies itself to the ribband of wax: at other times it resembles a pencil terminating in a point. After having moistened the whole of the ribband, the tongue pushes it so as to make it re-enter the mandibles, but in an opposite direction, where it is worked up anew. The liquor mixed with the wax communicates to it a whiteness and opacity which it had not before; and the object of this mixture of *bouillie*, which did not escape the observation of Reaumur, is doubtless to give it that ductility and tenacity which it possesses in its perfect state.

The foundress-bee, a name which this first beginner of a comb deserves, next applies these prepared parcels of wax against the vault of the hive, disposing them with the point of her mandibles in the direction which she wishes them to take; and she continues these manœuvres until she has employed the whole lamina that she had separated from her body, when she takes a second, proceeding in the same manner. She gives herself no care to compress the molecules of wax which she has heaped together; she is satisfied if they adhere to each other. At length she leaves her work, and is lost in the crowd of her companions. Another succeeds and resumes the employment; then a third; all follow the same plan of placing their little masses; and if any by chance gives them a contrary direction, another coming removes them to their proper place. The result of all these operations is a mass or little wall of wax with uneven surfaces, five or six lines long, two lines high, and half a line thick, which descends perpendicularly below the vault of the hive. In this first work is no angle nor any trace of the figure of the cells. It is a simple partition in a right line without any inflection.

The wax-makers having thus laid the foundation of a comb, are succeeded by the nurse-bees, which are alone competent to model and perfect the work. The former are the laborers, who convey the stone and mortar; the latter the masons, who work them up into the form which the intended structure requires. One of the nurse-bees now places itself horizontally on the vault of the hive, its head corresponding to the centre of the mass or wall which the wax-makers have left; and which is to form the partition of the comb into two opposite assemblages of cells; and with its mandibles, rapidly moving its head, it moulds in that side of the wall a cavity which is to form the base of one of the cells, to the diameter of which it is equal. When it has worked some minutes it departs, and another takes its place, deepening the cavity, heightening its lateral margins by heaping up the wax to right and left by means of its teeth and fore-feet, and giving them a more upright form. More than twenty bees successively employ themselves in this work. When arrived at a certain point, other bees begin on the yet untouched and opposite side of the mass, and commencing the bottom of *two* cells, are in turn relieved by others. While still engaged in this labor, the wax-makers return and add to the mass, augmenting its extent every way, the nurse-bees again continuing their operations. After having worked the bottoms of the cells of the first row into their proper forms, they polish them and give them their finish, while others begin the outline of a new series.

The cells themselves, or prisms, which result from the re-union and meeting of the sides, are next constructed. These are engrafted on the borders of the cavities hollowed in the mass. The bees begin them by making the contour

of the bottoms, which at first is unequal, of equal height; thus all the margins of the cells offer an uniformly level surface from their first origin, and until they have acquired their proper length. The sides are heightened in an order analagous to that which the insects follow in furnishing the bottoms of the cells; and the length of these tubes is so perfectly proportioned that there is no observable inequality between them. It is to be remarked, that though the general form of the cells is hexagonal, that of those first begun is *pentagonal*, the side next the top of the hive, and by which the comb is attached, being much broader than the rest; whence the comb is more strongly united to the hive than if these cells were of the ordinary shape. It of course follows that the base of these cells, instead of being formed, like those of the hexagonal cells, of three rhomboids, consists of one rhomboid and two trapeziums.

The form of a new comb is lenticular, its thickness always diminishing towards the edges. This gradation is constantly observable whilst it keeps enlarging in circumference; but as soon as the bees get sufficient space to lengthen it, it begins to lose this form, and to assume parallel surfaces; it has then received the shape which it will always preserve.

The bees appear to give the proper forms to the bottoms of the cells by means of their antennæ, which extraordinary organs they seem to employ as directors by which their other instruments are instructed to execute a very complex work. They do not remove a single particle of the wax until the antennæ have explored the surface that is to be sculptured. By the use of these organs, which are so flexible and so readily applied to all parts, however delicate, that they can perform the functions of compasses in measuring very minute objects, they can work in the dark, and raise those wonderful combs the first production of insects.

Every part of the work appears a natural consequence of that which precedes it, so that chance has no share in the admirable results witnessed. The bees cannot depart from their prescribed route, except in consequence of particular circumstances which alter the basis of their labor. The original mass of wax is never augmented but by an uniform quantity; and what is most astonishing, this augmentation is made by the wax-makers, who are the depositaries of the primary matter, and possess not the art of sculpturing the cells.

The bees never begin two masses for combs at the same time; but scarcely are some rows of cells constructed in the first, when two other masses, one on each side of it, are established at equal distances from it and parallel to it, and then again two more exterior to these. The combs are always enlarged and lengthened in a progression proportioned to the priority of their origin; the middle comb being constantly advanced beyond the two adjoining ones by some rows of cells, and they beyond those that are exterior to them. Was it permitted to these insects to lay the foundation of all their combs at the same time, they could not be placed conveniently or parallel to each other. So with respect to the cells, the first cavity determines the place of all that succeed it.

A large number of bees work at the same time on the same comb; but they are not moved to it by a simultaneous but by a successive impulse. A single bee begins every partial operation, and many others in succession add their efforts to hers, each appearing to act individually in a direction impressed either by the workers who have preceded it, or by the condition in which it finds the work. The whole population of wax-makers is in a state of the most complete inaction till one bee goes forth to lay the foundations of the first comb. Immediately others second her intentions, adding to the height and length of the mass; and when they cease to act, a bee, if the term may be used, of another profession, one of the nurse-bees, goes to form the draft of the first cell, in which she is succeeded by others.*

The diameters of the cells intended for the larvæ of workers is always 22-5 lines, that of those meant for the larvæ of the males or drones 3¼. The male cells are generally in the middle of the combs, or in their sides; rarely in their upper part. They are never insulated, but form a corresponding group on both sides of the comb. When the bees form male cells below those of neuters, they construct many rows of *intermediate* ones, the diameter of which augments progressively till it attains that of a male cell; and they observe the same method when they revert from male cells to those of neuters. It appears to be the oviposition of the *queen* which decides the kind of cells that are to be made; while she lays the eggs of workers, no male cells are constructed; but when she is about to lay the eggs of males, the neuters appear to know it, and act accordingly. When there is a very large harvest of honey, the bees increase the diameter and even the length of their cells. At this time many irregular combs may be seen with cells of twelve, fifteen, and even eighteen lines in length. Sometimes, also, they have occasion to shorten the cells. When they wish to lengthen an old comb, the tubes of which have acquired their full dimensions, they gradually diminish the thickness of its edges, gnawing down the sides of the cells till it assumes the lenticular form; they then engraft a mass of wax round it, and so proceed with new cells.

Variations, as has been already hinted, sometimes take place in the position and even form of the combs. Occasionally bees construct cells of the common shape upon the wood to which the combs are fixed, without pyramidal bot-

*Some late physiologists and entomologists have contended with Buffon that there is in fact nothing wonderful in the hexagonal form of the cells of bees, which are at first really cylindrical (thus corresponding with the form of their bodies), but forced to assume the six-sided form by the pressure on their sides of the multitude of bees engaged upon them; but surely if these authors had read Huber's work with attention they must have perceived that the fact stated by him above, that however large the number of bees at work on a comb, they do not work *simultaneously*, but *successively*, "each appearing to act individually in a direction impressed either by the workers who have preceded it, or by the condition in which it finds the work," is utterly at variance with their theory, as is indeed the whole of Huber's lucid and distinct relation.

toms, and from them continue their work as usual. These cells with a flat bottom, or rather with the wood for their bottom, are more irregular than the common ones; some of their orifices are not angular; and their dimensions are not exact, but all are more or less *hexagonal*. Once when disturbed, Huber observed them to begin their combs on one of the vertical sides of the hive instead of on the roof. When particular circumstances caused it, as, for instance, when glass was introduced, to which they do not like to fix their combs, he remarked that they constantly varied their direction; and by repeating the attempt, he forced them to form their combs in the most fantastic manner. Yet glass is an artificial substance, against which instinct merely cannot have provided them; there is nothing in hollow trees, their natural habitation, resembling it. When they change the direction of their combs, they enlarge the cells on one side to two or three times the diameter of those of the other, which gives the requisite curve.

To complete the detail of these interesting discoveries of the elder Huber, I must lay before you the following additional observations of his son.

The first base of the combs upon which the bees work holds three or four cells, sometimes more. The comb continues of the same width for three or four inches, and then begins to widen for three quarters of its length. The bees engaged at the bottom lengthen it downwards; those on the sides widen it to right and left; and those which are employed above the thickest part extend its dimensions upwards. The more a comb is enlarged below, the more it is necessary that it should be enlarged upwards to the top of the hive. The bees that are engaged in lengthening the comb work with more celerity than those which increase its width; and those that ascend or increase its width upwards, more slowly than the rest. Hence it arises that it is longer than wide, and narrower towards the top than towards the middle. The first formed cells are usually not so deep as those in the middle; but when the comb is of a certain height, they are in haste to lengthen these cells so essential to the solidity of the whole, sometimes even making them longer than the rest. The cells are not perfectly horizontal; they are almost always a little higher towards their mouth than at their base, so that their axis is not perpendicular to the partition that separates the two assemblages. They sometimes vary from the horizontal line more than 20°, usually 4° or 5°. When the bees enlarge the diameter of the cells preparatory to the formation of *male* cells, the bottoms often consist of two rhomboids and two hexagons, the size and form of which vary, and they correspond with four instead of three opposite cells. The works of bees are symmetrical less perhaps in minute details than considered as a whole. Sometimes, indeed, their combs have a fantastic form; but this, if traced, will be found to be caused by circumstances; one irregularity occasions another, and both usually have their origin in the dispositions which we make them adopt. The inconstancy of climate, too, occasions frequent interruptions, and injures the symmetry of the combs; for a work resumed is always less perfect than one followed up until completed.

At first the substance of the cells is of a dead white, semi-transparent, soft, and though even, not smooth; but in a few days it loses most of these qualities, or rather acquires new ones; a yellow tint spreads over the cells, particularly their interior surface; their edges become thicker, and they have acquired a consistence, which at first they did not possess. The combs, also, when finished are heavier than the unfinished ones; these last are broken by the slightest touch, whereas the former will bend sooner than break. Their orifices also have something adhesive, and they melt less readily; whence it is evident that the finished combs contain something not present in the unfinished ones. In examining the orifice of the yellow cells, their contour appeared to the younger Huber to be besmeared with a reddish varnish, unctious, strong-scented, and similar to, if not the same as, *propolis*. Sometimes there were red threads in the interior, which were also applied round the sides, rhombs, or trapeziums. This solder, as it may be called, placed at the point of contact of the different parts, and at the summit of the angles formed by their meeting, seemed to give solidity to the cells, round the axis of the longest of which there were sometimes one or two red zones. From subsequent experiments, M. Huber ascertained that this substance was actually *propolis*, collected from the buds of the poplar. He saw them with their mandibles draw a thread from the mass of propolis that was most conveniently situated, and breaking it by a sudden jerk of the head, take it with the claws of their fore-legs, and then, entering the cell, place it at the angles and sides, &c., which they had previously planished. The yellow color, however, is not given by the propolis, and it is not certain to what it is owing. The bees sometimes mix wax and propolis and make an amalgam, known to the ancients, and called by them *mitys* and *pissoceros*, which they use in rebuilding cells that have been destroyed, in order to strengthen and support the edifice.

We know but little of the proceedings of the species of bees not indigenous to Europe, which live in societies and construct combs like that cultivated by us. A traveler in Brazil mentions one there which builds a kind of natural hive: "On an excursion towards upper Tapagippe," says he, "and skirting the dreary woods which extend to the interior, I observed the trees more loaded with bees' nests than even in the neighborhood of Porto Seguro. They consist of a ponderous shell of clay, cemented similarly to martins' nests, swelling from high trees about a foot thick, and forming an oval mass full two feet in diameter. When broken, the wax is arranged as in our hives, and the honey abundant.—*Kirby and Spence.*

Costly experiments must ever prove an insuperable barrier to bee improvement among the poor.

Bee Culture in Cottage Hives.

No. 3.

It has been alleged that whenever and at whatever elevation our ordinary fruits—apples, pears, peaches and cherries—can be cultivated with profit in the open air, there also may bee-culture be successfully prosecuted. This allegation appears to be founded on facts, though, from our own observation and the statements of trustworthy writers, we may not assume that the converse of the proposition, in so far as it would apparently assign a limit to the range of bee culture, would be correct. Dietrich, a celebrated German pomologist, assumes twelve hundred feet above the limit of the ocean as the greatest height at which fruit-culture can be made a profitable pursuit. Yet we are acquainted with numerous more elevated districts in which though some few fruit trees are found, bee culture is prosecuted extensively, and swarms which issued prior to the 15th of June, usually lay up ample supplies for winter, and generally yield a surplus. Moreover, the Rev. Mr. Heubel states, in a communication to the *Bienenzeitung*, that in 1853 he saw at Braunsdorf, a village in the Thuringian forest, situated nineteen hundred and four feet above the level of the sea, an apiary of twelve hives, which produced a surplus of one hundred and eight pounds of honey that year. Bees rarely swarm there, and receive only ordinary attention from their owners, as these have no knowledge of any improved system of management.

The elevated districts to which we have alluded, are in themselves all poor honey regions, though differing in degrees of productiveness; and the results, we contend, show that even in such districts where bees, left to their natural resources, still succeed in accumulating some surplus stores, intelligent bee-keepers may render bee culture profitable, though using only the common cottage hive, for they can employ means calculated to increase that surplus materially.

These means are the following:

First—by effecting a diminution of the quantity of honey required for the support of bees under ordinary peasant management. It is well known that bees in their wild state in the forests, suffer more from cold, and hence consume more honey in winter, than they do when provided with comfortable hives and kept from exposure to extremes of temperature in a sheltered location. Increased care and attention in wintering bees will, consequently, diminish the consumption of honey and increase the available surplus. This, which is of great importance even in the best sections of country, will turn the scale between profit and loss in all poor honey districts.

The surplus thus secured may, in the second place, be further increased by regularly adopting measures to suppress the production of drones. Those who use the cottage hive, whether made of straw or wood, can largely secure this desirable object by making their hives broad and wide, whereby swarming will, in a great measure, be prevented. Bees may be taught, or weaned from, a habit of swarming, by the form of hive in which they are kept; and when they have little propensity to swarm, they feel a correspondingly small disposition to rear drones. Thus fewer drones are produced in broad and wide (mammoth) hives than in narrower and smaller ones, in which greater warmth and want of room excite and maintain the swarming impulse, with which drone-rearing is inseparably connected—because instinct teaches the bee that drones are indispensable during the swarming season. Whenever a change of queen occurs in a hive, whether in the swarming season or not, it will in cottage hives, in which it is always a natural process, be attended by an increased production of drones; and hence the use of broad and wide hives, having a tendency to repress swarming, counteracts this, and thus saves much honey—for a great deal of it is expended upon them in their larval state, and they are enormous consumers thereof when mature.

The suppression of the production of drones, it is true, cannot, so long as pasturage abounds, be effectually accomplished in ordinary cottage hives, as the drone combs cannot be removed, except in part, by cutting, and these are usually speedily replaced by similar combs. Recourse must therefore be had to properly constructed drone traps, to remove them as soon as possible after they make their appearance. Various ingenious devices have been employed for this purpose, but most of them are objectionable, as interfering too much with the ingress and egress of the workers, or endangering the life of newly reared queens. For this, among other reasons, we prefer using the wider and larger hives, in our practice, in which the bees have less inducement for building drone comb, and a drone trap is thus rendered in a great measure superfluous.

A further means of securing profitable results in the poorer honey districts consists in arranging to have your colonies populous when the full honey harvest opens. It is a well established fact, though one not sufficiently regarded, that a strong colony will gather from three to ten times as much honey in a day, in a favorable season, than a small or weak one; and it is equally certain that an intelligent apiarian has it in his power to place his colonies in this condition at the opening of the season.

Long as we have cultivated bees, it has never happened that, even in poor seasons, a strong colony which was restrained from swarming, failed to yield over a moderate supply of honey. But with colonies which had been allowed to swarm, and with young swarms, the case was almost invariably the reverse, in such seasons; and it has frequently happened that even first swarms were then so reduced by the middle of September, as to be on the verge of starvation. At that time, though we had read and studied numerous treatises on bee culture, we had literally no practical knowledge, and it was only by experience, often lamentable and dear-bought, that we came to understand how ruinous swarming proves to be in such districts. Exceptional cases, indeed, occurred, but they were rare,

and simply proved the rule. We learned to our sorrow that poor honey districts have this peculiarity, that they furnish but one brief period yearly of abundant pasturage, and if that cannot be properly availed of bee culture, will be a failure there for that season. If the spring be mild and promising, the new beginner, misled by his desire to multiply stock—a common and in his case an excusable though deplorable weakness—neglects to enlarge his hives at the proper time, but rather contracts them, and thereby stimulates his colonies to swarm. Still his expectations are frequently disappointed. The bees multiply in numbers, indeed, but *hang out* idly for weeks without swarming; the season passes unimproved by the workers for lack of room to store away what might be gathered, and he obtains neither swarms nor honey. But sometimes his hopes are realized, and he rejoices at the issue of swarm after swarm. Now comes a sudden change of weather, the blossoms cease to secrete nectar, or a prolonged raining spell prevents the bees from securing what might be gathered. Then the disappointed bee-keeper finds himself in possession of weakened old stocks only half supplied with stores, and young swarms unable to procure the needed supplies, and liable to perish of destitution and want. He can contemplate with gratification perhaps only a few old colonies which failed to swarm, and having occupied roomy hives, could accumulate honey enough for their wants, with some surplus for the use of their necessitous neighbors. But what is this among so many? The first inquiry is, of course, how many of these poor swarms or impoverished colonies are worth an attempt at preservation. He finds his swarms have only half-filled their hives with comb, and must be united with others and the united stock then fed, so that after much trouble and no small expenditure of money, the luckless bee-keeper finds the hives in his apiary reduced to the original number—and all hope of realizing any profit from them has vanished. But this is not the worst of the evil. He must abandon all expectation of having populous and well supplied stocks, at the opening of the season the following year. We have ourselves experienced all this, not once, only, but repeatedly: and we advert to it here the more emphatically, because we are all very prone to attribute to a supposed unfavorable season that which results from our own mismanagement. For why, if the fault was with the season, were our non-swarming stocks so well stored with honey that they could yield a surplus, and yet be healthy, strong and populous next spring?

It is an ascertained truth that, even in very poor districts, though the supplies of forage are furnished for only a very brief period, they are then so ample that a populous colony can store up several pounds of honey daily, if it possess enough empty combs. From the mere circumstance that at such precious time, we were in possession of strong stocks, and plenty of empty comb, and could thus keep our bees from idling away their time, were we able to secure most gratifying results. In the course of a single week, several of our stock hives increased thirty or forty pounds each in weight; and we have known instances where the increase was sixteen pounds in a day; while the bees of most of our neighbors literally stored up nothing because their colonies were too feeble to avail themselves of the abundance around them, or had to devote the honey they gathered to eking out the combs which had been improperly pruned.

From these remarks may be deduced several rules, already indicated, which should be observed in the management of bees in poor honey disiricts:

1. Never cut out empty combs from your hives; and carefully preserve the combs of hives the bees of which you unite with other stocks in the fall. Much time is wasted in comb-building, which could be profitably devoted to gathering and storing honey; and, in addition thereto the production of wax involves a large expenditure of honey which your bees may need for their own support. This can be saved if we do not remove any empty combs; and much can be gained, if we are able to furnish the bees, at the gathering season, with supers or top-boxes, containing empty combs. They then need not build, but can devote all their indomitable energy to the gathering and storing up of the supplies which a favorable but transient occasion furnishes.

I would here earnestly caution those who reside in poor honey districts against the to them ruinous practice of spring pruning, which many carry to the extent of removing all but a few honey-filled rudiments at the ceiling of the hive. This process is literally a death-blow to profitable bee culture in such districts, for it constrains the bees to devote what little honey they have remaining to building comb at a season when supplies cannot be obtained abroad, and compels them to fly out in unfavorable weather in search of sustenance for their brood, whereby numbers are lost. If on the contrary the empty comb is not removed, the bees, undisturbed in their economical arrangements, will devote themselves to nursing their brood, and soon have a strong population ready for the operations of the coming season. Free pruning away of empty comb, in the spring, is only permissable in cottage hives when the colony is populous and well supplied with stores, and when the season has already opened favorably and *promises so to continue.* But just here is the difficulty—we cannot foretell the weather; and the sanguine farmer is most apt to misinterpret its indications. The danger and delusion consist in this, that the operation is *occasionally* successful—and though it be only once in fifty times, that is enough to mislead numbers.

2. Another rule to be observed is that in poor honey districts we must be careful to have one colony well supplied with honey. In a hive deficient in honey, brooding will not be prosecuted vigorously, and it will consequently be still weak in numbers when the honey season opens. Irrefragable experience teaches this. In wintering stocks, therefore, it should be an undeviating practice to see that they contain not only

a sufficiency of honey to serve them for the winter, but at least twice as much as they will probably need—thus, instead of twenty pounds net, leave them forty pounds. The surplus will not be lost nor squandered; if not needed, it can be removed in the spring. The colony will meantime be safe from the most unfavorable vicissitudes of weather, and survive the winter in health and vigor. We shall then have strong stocks, each of which will labor with more success and advantage than ten starvelings together. This is one of the most important points of practical bee culture in poor honey districts, for bees that must be carried over the winter by feeding, are more than half lost at the start, and will never do more than live along through the spring, if they survive the vernal equinox.

3. A third rule is to restrict swarming or suppress in altogether, as soon as the apiary contains the number of stocks we propose to have; for unrestricted swarming is the ruin of bee-culture in poor honey districts. Second swarms should never be accepted. Their queens should at once be destroyed, unless wanted for other uses, and the bees permitted to return to the mother hive. Impoverished mother stocks, and starveling second swarms, would require all our surplus honey for their support, yet never be able to render any adequate return. It should be adopted as an undeviating rule always to locate the first swarm on the spot where the mother hive stood, and remove the latter to a new location. Further swarming will thereby be prevented, and both parent and child will thrive.

The wife of Mr. Jacob Zerr, living at Geiger's Mills, Berks Co., Pa., while about some bee-hives, was stung in the left ear by a bee. From the effects of the sting Mrs. Zerr was in a few minutes thrown into a violent spasm, frothing at the mouth, her limbs becoming rigid, her jaws tightly locked, and losing entirely the power of speech. For a time the most serious consequences were apprehended, as no medicine could be got between her lips. Finally, however, through the efforts of a gentleman who was present, she was partially restored by rubbing her with camphor and brandy. A physician was sent for, who thought she would recover entirely, in a few days, from the effects of the sting.

The rural bee-keeper, if he have only a soul to appreciate the works of God, and intelligence of an inquisitive order—and intelligence is sure to expand with the attentive study of any branch of natural history—cannot fail to become deeply interested in observing the wonderful instincts (instincts akin to reason) of those admirable creatures, the bees. At the same time he will learn many lessons of practical wisdom from their example.

There is no doubt whatever that the queen bee is in her prime for breeding, the *second* year of her existence; after which her vigor sensibly declines.

Two Fertile Queens in One Colony.

☞We published, in our August number, a case of two queen bees found in one colony, in Germany. The following account of a similar case, observed in this country, has since been sent to us. They are nevertheless rare occurrences:

Messrs. Editors.—I wish to bring before the readers of your journal, an incident which occurred during the past season, in my apiary. It may already be familiar with some bee-keepers, but I think it a rare occurrence.

It is this: "A colony of bees in possession of two fertile queens." This was a swarm of Italian bees, in which I had been raising queen cells. The cells had all been removed but one. About two days after the queen had emerged from this cell, I removed her to a nucleus box, and the next morning gave them a choice fertile queen, in order that the comb might be filled with eggs for another crop of royal cells. The next day but one I examined this stock, and, to my astonishment, I found a young queen, and the fertile one at the entrance of the hive, dead. I immediately examined the nucleus to which the young queen had been removed, and found she was gone. I again removed this queen to a queenless stock, and gave the first another fertile queen, with clipped wings. On examining this stock, two or three days after, I found this young queen again. Supposing, of course, that the fertile one had met the fate of the first, I felt grieved enough to have destroyed this queen at once, but exercised the part of forbearance towards her, and closed the hive.

About three days after, a gentleman called to procure a queen. I showed him some, and, among the rest, I opened the hive which contained the notorious queen. On the first comb I took out I was much surprised in finding the queen with clipped wings. I took out another comb and found the young one also, and to all appearances she was fertile. I transferred her at once to a queenless stock, where she immediately commenced laying eggs. These queens must have been together four or five days.

There is no question but what this queen had left the hive for sexual intercourse with the drones before I removed her to the nucleus box, but was unsuccessful; and as this hive stood isolated from the others, the location was marked by her; consequently, on her two subsequent excursions, she returned to the same hive.

I am unable to give any reason why the unfertile queen should have been preserved in preference to the other. She was readily accepted, and commenced laying eggs. Neither can I conceive why the two remained so long together, unless it was for the reason that the old queen showed signs of unfertility, which I discovered was the case afterwards.

If there are those who have had similar cases, I would like to hear from them.

Perkinsville, Vt., 1866. C. B. Biglow.

There is no "royal road" to successful bee-keeping. as there is none in anything else.

The Pillage of Hives.

There is perhaps not any circumstance connected with the management of an apiary, to which less attention is paid, than the pillage that is carried on, not only by the bees of the sams apiary, but by stranger bees, and to which may be attributed the loss of many valuable hives. Lombard, who, although undeservedly so, is quoted as high authority amongst the apiarians of France, assures us that a hive is never pillaged, except on the death or the sterility of the queen ; an opinion, to which not the slightest value should be attached. It may, indeed, be admitted that a hive will be pillaged when the queen is no longer able to perform her functions, but it is well known to all keepers of bees, who are versed even in a slight degree in the management of their hives, that the bees, which are in the same apiary, and who possess a fertile queen, pillage each other, especially in the spring and the fall of the year. The swarms of the early part of the summer, being in a state of famine before the plants and flowers can supply them with a proper quantity of food, are driven by want to acts of pillage, on nearly the same principle that the late swarms in August, which have not been able to collect a sufficiency of provisions, consider themselves entitled to rob their neighbors of their superfluous store. It sometimes, indeed, happens that the bees, who inhabit the most populous and well provisioned hives, betake themselves to the predatory system, and desolate those which are in a weaker condition.

The chief cause which excites bees to pillage, is a natural greediness and an over-anxious desire of collecting provisions for the purpose of enriching their own domicile. The bee in its nature is a most insatiable insect ; not exactly in regard to the satisfaction of its appetite, but to the amassing of those provisions, which are to protect it from want during the winter ; and this accounts for the best provisioned hives carrying on the system of pillage to its greatest extent ; for, being conscious of their own strength, they know that they have nothing to fear from the attack of others ; and it may be said, that it is only the weak hives, which suffer from the pillage of their own race. Actual want and necessity may, however, sometimes be taken into the account ; for it is no unusual case, that the best peopled hives are precisely those which are the most in want of provisions, and therefore they fall upon the weaker societies, which, from the paucity of their numbers, are better provided with food.

There is, however, another source of this evil, and which is very apt to happen in the common straw hives. This arises from the moths and other insects, which penetrate into the hive and there multiply, devouring and spoiling all the works of the hive to such an extent, that the bees, judging it most advisable to leave their domicile, defend it but weakly, and then leave it as a prey to the first comers. Afterwards these wandering and vagabond bees seek in their turn to live at the expense of others ; if they be very numerous, they besiege another hive, driving out the lawful proprietors of it, and ravaging their provisions without mercy. Those, which have been driven from their dwelling go in their turn in quest of food, or rather on the pillaging system ; and thus the evil, by force of example, becomes, as it were, epidemical. The best furnished hives are for this cause often seen desolated, and entirely ruined. The bees of those hives which have been gnawed by the mice and and other animals, or which have experienced the cruel visitations of the wasps and the hornets, are often obliged to forsake their homes, in order to seek for subsistence in other hives, more healthy or better furnished.

Such are, in short, the principal causes of the pillage of the hives, an evil of such serious and injurious consequencs, that the utmost vigilance should be used to prevent it.

There are some days and seasons in which the pillage is carried on to a much greater extent than others. This is a circumstance very easily to be accounted for. The pillage is most to be feared after two or three days of rain, when the weather is not suitable for the collection of honey, for hunger then presses more severely on those hives, which have suffered from a want of provisions ; and as idleness is the mother of all vices, the bees, having no other occupation on their hands, determine upon paying a visit to their neighbors, and robbing those, who are weaker than themselves.

In regard to the seasons in which the evil exists to the greatest possible extent, it may be reckoned that there are two in the year. The first may be computed from the month of March to the middle of May. From that time to the end of August or the middle of September, it is very rare that a hive is attacked by robbers. As soon as the honey season begins to decline, the pillaging bees are seen hovering round particular hives, as if reconnoitering the exact point where the attack is to be made. We would advise the apiarian to pay particular attention to that hive about which he sees a number of bees hovering on the wing ; their presence bodes no good to it, and he must not be surprised, if in a few days he finds it formally and vigorously attacked by a whole gang of robbers.

As, however, prevention is in all cases better than a remedy, it is actually necessary that every apiarian should make himself acquainted with the principal signs which display themselves when a hive is about to be pillaged.

In the first place, a more than ordinary noise is heard before the hive, and also throughout the whole of the garden, and if the ear be placed to the hive, the noise within resembles a loud hum, which arises from the motions of the bees, some defending their provisions; others robbing them, and as those bees, which are to be seen entering in crowds, come and depart with great glee and precipitation, the increased noise is accounted for which is heard in the garden.

Battles and duels are then seen at the entrance of the hive, which is besieged at all points; some bees enter in haste, others depart

with the utmost velocity, and almost all of them are fighting, some to effect an entrance by force, others to prevent it; whilst others are busily engaged in driving out those who have already obtained admittance. Some are observed in the pursuit of others, whom they catch hold of by their hinder legs or their wings; and who, knowing that their life is in jeopardy, are seen making every effort to escape. Others fall upon those who arrive, and often upon one of their own community, whom they are prevented recognizing from the anger by which they are instigated, and to whom they seem disposed to give no greater degree of quarter than to the strangers. In fine, there is on the whole a disorder, a confusion, a frightful carnage before the entrance of this ill-fated hive, which scarcely knows friend from foe, and the bees of which attack each other without discrimination,

When, therefore, several bees are seen hovering about, and particularly before the entrance of the hive, and they are seen to alight at times near the bees which guard the entrance, and fly away with rapidity; and finally, when a bee of the hive recognizes the daring robber, then may the hive be considered as in great danger. These bees may be called the foragers or advanced guard, who are sent forth to discover the most vulnerable point of the hive on which the attack is intended to be made. Further, if on closely examining the hive, a bee is perceived to dart upon one, or upon a number of others which hover about the hive, and that this bee, after having pursued his enemy returns immediately to join his companions, and places himself with them in a menacing posture, which is not difficult to be ascertained by those who are in the habit of watching the motions of these extraordinary insects, the conclusion may be instantly drawn that this hive is threatened with pillage. These bold and audacious robbers are seen to pass with an astonishing rapidity before the entrance of the hives where the domiciliated bees are always on their guard against their enterprise. Sometimes they alight with the greatest effrontery in the very midst of those who guard the avenues, and then take to their wings with the utmost precipitation, when they see some of the domiciliated bees, who have no idea of taking a joke, pounce upon them, and, like death-head huzzars, give no quarter to the enemy.

At another time, when the robber delays his escape too long, a bee of the hive catches him by the hinder leg, and yields not his hold until the intruder takes wing, dragging his enemy after him. If, during this struggle, two or three other bees should come to the assistance of their companion, woe then to the robber; he is seized by the legs and wings, and he may deem himself fortunate, indeed, if he escape with his life.

When these signs present themselves, the greatest fears may be entertained for the hive, and if, instead of one or two bees hovering about it, a number are seen, dodging here and there, the conclusion may be drawn that the weakness of the hive has been discovered, and that it is on the eve of being regularly and formally attacked. It becomes therefore a particular part of the duty of the apiarian to pay frequent visits to his hives during the seasons when robberies are the most prevalent. Particular care, however, should be taken not to confound the robbing bees with the young ones, who from the hours of twelve to three amuse themselves by flying about the hives in great numbers, and whose motions very much resemble those of the pillaging bees. There are, however, particular signs by which the attentive observer may distinguish the young bees from the strangers, who are meditating an attack. The young bees keep constantly before the entrance of the hive, and they have always the head turned towards its centre, whereas the besieging bees dodge about the hive in every quarter, without confining themselves to any particular position.

There exists a very simple method of ascertaining whether the bees, which are hovering about in numbers before the hive, belong to the apiary, or whether they be robbers. Sprinkle some flour on the bees, and then watch if any of them enter the hive without opposition, which immediately determines whether they be friends or foes.

In regard to the prevention of pillage, if there be a weak hive in the apiary of which any fear is entertained, let the following plan be adopted. The hive must be instantly removed from the apiary, and placed in a retired situation in the garden, about five or six hundred paces, or a quarter of a mile distant, and it should then be covered with branches or fagots, to protect it from the view of the bees flying into the fields in search of food.

The entrance must be so contracted as to permit only one bee to come out at a time, which is very easily done with putty or clay; in which state the hive must be left until it be perceived that it is wholly tranquil, and that it is no further molested by stranger bees.

The removal of the hive, however, must in some measure depend on the discretion and judgment of the proprietor, especially when the pillage is supposed to proceed on account of two or three days being adverse to the collection of honey; because, under such circumstances, it would be sufficient to close the entrance of the menaced hive, leaving open merely a small aperture for the bees to inhale the air. It is a plan, however, which we generally follow when we see a hive threatened with robbers; but if, on opening it, two or three days afterwards, it is still perceived to be in danger, we then lose not a moment in removing it.

As the greater number of the hives which are tormented by robbers are weak and in want of provisions, it would be advisable to give them a little food in the evening after sunset, taking care at the same time so to close the entrance that no stranger bee can gain admittance; for were this precaution neglected, the danger of the hive is increased, not removed. Considerable judgment is required in the feeding of weak hives, for from a want of the necessary precaution we have often seen a whole apiary put into commotion, and especially if the food has been administered exteriorly.

It has frequently fallen under our experience that the removal of a hive to a distant place is not always a cure for the evil that prevails, for such are the activity and vigilance of the bees, that they will discover a weak hive at any distance from the apiary. Under these circumstances we advise the proprietor to take the hive into a granary or other outhouse, in which there is a window fronting the south, at which the hive must be placed, but the entrance so closed that no bees can come out. A little food should be given to them; and in about three or four days the window may be opened, and the bees set at liberty. This, however, must only be done in very fine weather. Should the hive be discovered by the strangers, the window can be immediately closed, and all further attack is then prevented. In this case, however, a number of the native bees, who actually belong to the hive, will be necessarily excluded, and which perhaps cannot obtain admission without also admitting the strangers. In the course of an hour, however, the strangers, disappointed of their booty, will retire, and the lawful bees may then be permitted to enter.

When a hive is removed, a *ruse de guerre* should be played off, and an empty hive put in its place. This will amuse the robbers returning on the following day, and will prevent them attacking any other hive, which might prove too weak to oppose them; for the same proverb holds good with bees as with men, that stolen goods are sweet; and when the bees of a hive once take to robbing, they follow the occupation with the greatest ardor, and the best apiary, under such circumstances, will be soon depopulated.—*Huisch.*

Bees in Africa.

FROM BURTON'S TRAVELS.

The 2d of September saw us *en route* to Marenga Mk'hali, or the "brackish water." * * * * Here, for the first time, beehives, called by the coast people mazinga, "cannons," from their shape, hollowed cylindrical logs, closed with grass and puddle at both ends, and provided with an oval opening in the centre, were seen hanging to the branches of the foliaged trees.

* * * * * * *

We made *bonne chère* of Rubuga, which is celebrated for its milk and meat, ghee, and honey. On the way-side were numerous hives, the mazinga, or "cannon," before described. Here, however, they were raised out of the reach of ants, white and black, upon a pair of short forked supporters, instead of being suspended from the branches of a tall tree.

* * * * * * *

The East Africans ignore the sparkling berilie or hydromel of Abyssinia and Harar, and the mead of the Bushman race. Yet honey abounds throughout the country, and near the villages log hives, which from their shape are called mazinga or cannons by the people, hang from every tall and shady tree.

Bees also swarm in the jungles, performing an important part in the vegetable economy by masculation or caprification, and the conveyance of pollen. Their produce is of two kinds. The cheaper, resembling the wasp boney of Europe, is found in the forest and stored in gourds. More than half filled with dirt and wood bark, it affords but little wax; the liquid is thin and watery, and it has a peculiarly unpleasant flavor. The better variety, the hive honey, is as superior to the produce of the jungle as it is inferior to that of India and more civilized lands. It is tolerable until kept too long, and it supplies a good yellow wax, used by the Arabs to mix with tallow in the manufacture of "dips."

The best honey is sold after the rains; but the African hoards his store till it reddens, showing the first stage of fermentation. He will eat it after the second or third year, when it thins, froths, and becomes a rufous-brown fluid of unsavory taste; and he barely takes the trouble to remove the comb, though the Arabs set him the example of straining the honey through bags of plantain straw or matting. Decomposition, moreover, is assisted by softening the honey over the fire to extract the wax instead of placing it in the sun. The price varies from one to three "cloths" for a large gourd full. When cheap, the Arabs make from it "honey sugar." The material, after being strained and cleaned, is stored for two or three weeks in a cool place till surface granulation takes place; the produce resembles in taste and appearance coarse brown sugar. The "siki," a vinegar of the country, is also made of one part honey and four of water, left for a fortnight to acetize; it is weak and insipid. Honey is the only sweetener in the country, except in places where the sugar-cane grows, namely, the maritime and Lakist regions. The people chew this, ignoring the simple art of extracting and inspissating the juice; nor do they, like the natives of Usumbara, convert it into an inebrient. Yet sugar attracts them like flies; they clap their hands with delight at the taste; they buy it for its weight of ivory, and if a thimble full of the powder happen to fall upon the ground, they eat an ounce of earth rather than lose a grain of it.

* * * * * * *

The forest which we now entered, situated 4,535 feet above the level of the sea, abounded in bees. * * * * These became more plentiful in the heights, as on the upper regions of Fernando Po. Already at Mapanya, we had seen in the hands of the villagers a dark and dirty comb. The savages ignore hives, even to the extent of the East African log or "cannon." In the upper regions, where a clover abounds, like the Retama of Teneriffe, to which the hives are yearly removed, the honey is excellent. The creatures build in hollow trees, producing after four days' labor, it is said, a delicious white honey, which is easily taken from them, even in the day time. Our camp was infested by them; they seek moisture, and disappear in swarms before cold or wind, mist or night. The busy insect appears here, as at Fernando Po, unusually amiable, sociable, and stupid, and its stings were little more painful than those of the horse-fly. It is different in

the plains of Africa. Mungo Park, in his last expedition, twice saw his caravan dispersed by swarms, and seven beasts killed. In the eastern regions I lost in one day three asses, and witnessed the capture of a village by bees.

Deprivation and Suffocation.

There is no species of stock which produces so great a profit with so small an outlay as bees, and the question then arises, in what manner can that profit be rendered the greatest, whether by depriving the hives of their superfluous store, or suffocating them at the end of the season? This question has been discussed by almost every apiarian, particularly the French; and whilst each system has met with its enthusiastic advocates, the one supported by humanity, the other by prejudice and antiquated customs, we find that the question stands nearly as it did at the commencement, in an undetermined and unsettled state. We have met with many bee masters, who, on the score of humanity, showed themselves most anxious to adopt the system of deprivation; but who were actually deterred from it by the almost insuperable obstacles with which deprivation is attended in the common cottage hive. To contend with a few thousands of infuriated insects appears to be an act nearly allied to madness, when the same if not a greater share of profit can be obtained by a half-penny worth of sulphur. We therefore consider it utterly hopeless to introduce the system of deprivation into this country, so long as the common straw hive is in general use.

The process of deprivation appears at the first to be one of a most formidable nature; but it is in reality not so much so as it seems to be. The operator has always in smoke a most powerful auxiliary, by which he can in a moment quell a hive of bees, in the utmost state of irascibility; and with this potent aid at hand, the most timid person may fearlessly extract the combs even from the cottage hive. The following is the process to be adopted: The first point is to ascertain the weight of the hive, from which a correct estimate may be formed of the quantity that can with safety to the bees be taken from them. A different calculation, however, is to be observed between an old and a new hive, and the particular season of the year must be taken into the account, in which the deprivation takes place. The weight of an old hive is not always a correct criterion of the quantity of honey, as in all old hives there is a superabundance of bee bread, which is the most ponderous substance in a hive. Take fifty cells filled with bee bread, and fifty cells filled with honey, and the weight of the former compared with that of the latter will be as three to two. If the hive weighs thirty pounds, which is by no means an unusual weight, if deprived in the spring, it can well afford to lose ten pounds, but if in the autumn, we would not recommend more than five to be taken. The operation of deprivation should be always performed in the evening, when it is supposed that all the bees have returned from their labors; for if performed in the middle of the day the operator is so dreadfully annoyed by the bees returning from the fields, that he is surrounded by hosts of angry insects, and the whole apiary perhaps put into confusion. The hive must be gently lifted from the pedestal, and placed with the combs upwards on the ground. The entire surface of it will appear a living mass, and the timid operator dreads the consequences which might ensue to him, were only a thousandth part of the insects to wreak their vengeance upon him. Calling, however, to his assistance the fumigating bellows, he proceeds to pour upon them a Vesuvian smoke, and, in a moment, the utmost alarm prevails, and the bees hurry to the furthest extremity of the hive in order to protect themselves from such an unexpected nuisance. The absence of the bees will give the operator a full opportunity of examining the state of the combs, and determining on which side to begin the operation. The extraction of the first comb is usually attended with the greatest difficulty; the second is more easily extracted on account of the space which has been left by the extraction of the first. Should the bees show a disposition to be troublesome, repeat the application of the smoke, and their interference will be checked in a moment. In cutting out the combs, particular care should be paid not to cut into two combs at once, but, if possible, to extract one completely, before a second one be cut into. Here, however, steps in the chief obstacle to a clean and expeditious extraction of the combs, which is the sticks that are almost universally placed in the hive, with the intent of keeping the combs from falling. The extraction of a complete comb becomes under those circumstances, a direct impossibility. The combs must be cut into pieces in order to disengage them from the sticks; the operation becomes unpleasant and disheartening from the hands being covered with honey, independently of the great loss which is sustained by it flowing from the combs. In some instances, we have found it impossible to cut out a comb to its very foundation at the top, and the bees then in the hive being returned to the pedestal are literally drowned in their own sweets. We cannot too strenuously recommend the omission of these sticks. They are by no means required for the support of the combs, as the bees know well how to give their combs all the support they require, and in all operations connected with the interior of the hive, they are a direct and insufferable nuisance.

The requisite amount of honey being extracted, the hive may be returned to its pedestal; but it should not at first be placed directly upon it, but let it be supported by a stone or two about an inch from it, whereby the lives of a number of bees will be saved, which would otherwise be crushed between the hive and the pedestal; the supporters, however, must be removed the same night, or on the following morning the proprietor will have the mortification of beholding the hive, that has afforded him so rich a harvest, the prey of a host of robbers, who, scenting the honey that has been spilled, will attack it from every quarter.

The operation of deprivation, when the fumigating bellows are not at hand, is one which we would recommend few persons to undertake. It is one of extreme difficulty and hazard, and in many instances has exhausted the patience of the most enthusiastic apiarian. We will, however, give the description of it for the benefit of those who may feel disposed to try the experiment.

In the first place, an empty hive must be procured of the exact diameter of the hive which is to be deprived; the full hive being lifted from the pedestal and reverted as before, the empty one is placed over it, and the hives being consolidated, a sheet or a large table cloth must be wrapped round them at their point of junction, in order to prevent any of the bees from escaping out of the hive. This arrangement being completed, the lower hive is beaten gently with the flat hands, or with sticks, for the purpose of so alarming the bees as to force them to ascend into the upper hive; and now arrives the trial of the patience of the operator. In some instances we have known the bees to ascend in ten minutes or a quarter of an hour, in others we have not succeeded after knocking and thumping for three or four hours; and in some cases, we have been obliged to desist altogether and relinquish it as a hopeless task. The ascent of the bees into the upper hive is to be ascertained by a loud humming noise, which is supposed to be indicative of the queen having ascended into the upper hive; and the bees make known the fact to each other by the expressions of their joy. The under hive being pretty clear of bees, (for it is in vain to hope that all of them will have left it,) it must be taken into some outhouse, during which time the hive with the bees in it may be left covered up with the table cloth or sheet. The process of extracting the combs has already been described, and it having been accomplished in this case, the deprived hive must be taken to its original station and the bees returned to it. In order to effect this, place a stool or chair exactly level with the entrance of the hive, throw the table cloth over the chair, and, holding the hive with the bees on it over it, give it a smart knock, on which the bees will fall upon the cloth. Then guide a few to the entrance, who will begin immediately to vibrate their wings with joy; the whole community will on hearing the welcome sound hurry into the hive, and in ten minutes not a bee will be left on the cloth.

In order however to prevent the suffocation of the bees, and still to obtain a proportionate quantity of their riches, without undergoing the difficult and tedious process of deprivation, let the following plan be adopted: In the month of March cut off three or four bands of the top of the hive, and place over the orifice a small hive of from four to six inches in diameter. As the honey season approaches, the bees will proceed to construct their combs in the small hive, and by August or September it will be full of excellent honey comb, which may be taken away without the least fear of subjecting the bees to famine, as the very act of filling the small hive presupposes that all the cells in the hive are full, and consequently an adequate supply of provisions exists for the winter.

There are two seasons of deprivation, the spring and the autumn, and each has its strenuous advocates. We, however, strongly recommend the former, on account of the certainty which then exists of the bees being able to replenish the vacuum before the winter sets in; whereas in the autumnal deprivation, the vacuum exists during the whole of the winter, which, on account of the foul and humid air which is engendered, is highly injurious to the bees. It may indeed happen, that if the deprivation take place immediately after the swarming season, the bees will have time to fill up the vacuum before the winter sets in, but we very seldom knew it to be the case. One of the objections urged against the spring deprivation is, that it is apt to prevent the hive from swarming, and we admit that there is some validity in the objection; but an isolated case ought not to operate to the injury of a whole system, for although it may happen in particular cases that the deprivation will prevent the swarming, yet as it cannot be urged as a general principle, a great part of the objection is thereby rendered invalid. On the other hand, the great objection to the autumnal deprivation is, that the proprietor, from an overgreediness to obtain a considerable booty from his bees, is apt to take more than he ought to do, and consequently exposes his bees to the danger of famine. It is bad practice to deprive a hive on *both* sides, but it seldom happens that more than two combs can be extracted on one side, without interfering with the brood combs, which, in other words, is tantamount to the destruction of the hive.

In the works of Varro and Columella, we find some interesting remarks relative to the deprivation of hives, for it would appear in their time as if suffocation were totally unknown. The former of these naturalists mentions two methods of proceeding; one by changing the bees from one hive to another, and the other by deprivation. He is however very sparing of his information relative to the details of those operations, but he is manifestly in an error when he says that nine tenths of the honey may be extracted.

The method of collecting the produce of a hive by suffocation is adopted in most countries, but especially in England, France, and Italy. In Germany, the great bee masters were long more inclined to the storifying system, which, in their opinion, renders the act of deprivation easy and safe. Ranconi, in his Dictionary on Italian Agriculture, says, "that the suffocation of bees is a most abusive practice, as it tends to destroy this species of insects, so interesting by their ingenious industry."—*Huish.*

A well mown and cleanly kept grass plot, or a gravel walk, affords a capital ground for hives to stand upon. They should not, however, be far distant from some wall or thick fence in the rear; but there must be *plenty of room behind* for the performing of every necessary operation.

Bees in Brazil.

M. Hanneman, an intelligent bee-keeper who emigrated from Germany to Brazil about ten years ago, taking two hives of bees with him, and who has been very successful in bee culture there, recently gave an account of his operations in a communication to the *Bienenzeitung*, from which we make some extracts.

He says: "I practice bee culture here on an entirely new system, devised by myself, adapted to the requirements of the climate, and which enables me to maintain a very large apiary at small expense, and yet so profitably that I can truly say that all I possess is the product of my bees. The bee-keepers of this province (Rio Grande du Sol) however, know nothing as yet of this system, as I am not disposed to let the results of my experience, obtained at a sacrifice of time and money, be misused and brought into discredit by incompetent hands, and the Government give no heed to the protection of any branch of industrial pursuits.

"Of Dzierzon's invention I can barely use the slats, and those *nailed fast* and applied in hives rather long than high. And I would wager any sum that were Dzierzon and Berlepsch here, and engaged in bee culture, they would speedily abandon the use of their movable combs and transportable hives. In a poor season, multiplication of stocks artificially is with us not only useless but injurious, and in a fertile and favorable year swarms come in undesired numbers, and can by no process be prevented. I should like to see the man who could check the propensity for swarming, and restrict the bees to honey-gathering alone. It is here a sheer impossibility, and militates against the uncontrollable impulse of the bees to send forth swarms in the propitious climate of this extraordinarily favored and productive country; and I am firmly convinced that any one who should attempt to obviate the conditions and counteract the propensity for swarming, so as to render this impossible, would very soon get tired of the undertaking and abandon it in despair.

"The years 1857 and 1858 were the most productive of any since I came here. In each of these I obtained three tons of pure honey and seven hundred and fifty pounds of wax. But in 1859 I obtained only about two-thirds as much of each; and the year 1860 taught us that every country and every pursuit is, at times, subject to some peculiar disadvantage or drawback. The spring opened finely, but after I had obtained and secured about three hundred swarms, a cold rain, lasting four days, set in and destroyed all the forage. The bees ceased to labor, and swarming was at an end. The spring of 1861 opened tolerably fair. But after I had secured one hundred and forty swarms, a violent hail-storm occurred, and all our fond hopes were blasted. The bees no longer flew out even when the weather was fine, the entire apiary was as silent and deserted as in winter, and presented a disheartening aspect. The young swarms starved, and the old stocks could only be preserved by plentiful feeding. I too discovered, somewhat late indeed, that man must come to the rescue when nature withholds her gifts. The small quantity of wax I obtained in the spring scarcely sufficed to defray the cost of the four barrels of sugar fed to my bees, and some colonies perished nevertheless, reducing my apiary to one hundred and twenty stocks.

"On this occasion I was compelled to feed nearly eighty colonies, and this circumstance led me to devise a peculiar mode of feeding with sugar. As neither loaf sugar nor sugar-candy is to be had here, I dissolved the common sugar in water, clarified it, and then boiled it down to the consistence of taffy, and run it into paper-lined tin or wooden moulds, to the thickness of one tenth of an inch. When cold, I cut these into strips of about four inches long by two inches broad, and insert these weekly or oftener from below, between the combs, near the cluster, or lay them on the slats above. By this process I saved the cost of feeding troughs, and the wearisome toil of administering liquid food or diluted honey. When the spring opened, I fed my bees in the open air, as my Portuguese neighbors kept none.

"The year 1864 was one of great abundance. The spring was dry and favorable, and every hive, whether containing old colonies or recent swarms, was speedily so stored with honey that few brood cells remained. From one hundred and seventy stocks which I had wintered, I obtained six hundred swarms; which number, by uniting, I reduced to three hundred and twelve. These yielded me three tons of honey, and nearly seven hundred pounds of wax. In the fall I reduced the number of my stocks to two hundred and eighteen. Of these I lost six the following winter—leaving me two hundred and twelve to begin the ensuing year with; and as I had then forty-two stocks more than in the previous year, and that number of empty hives less, I found great difficulty in disposing properly of the six hundred swarms which the next season produced.

"It will be seen from the foregoing that in suitable districts and favorable seasons, bee culture is a very different affair in this country from what it is in most others. As we have two swarming seasons in the year, the enlargement of an apiary proceeds very rapidly, and may, with proper management, be safely indulged in."

It is folly to talk of the *cheapness* of hives. If a man intends to keep bees, he must in the first place have his hives made in the very best manner; by this we mean of good materials and of good workmanship. A hive badly joined by a bungling carpenter, is worse than a hollow log. One half of the labors of the bees will necessarily be devoted to keeping their dwelling in a tenantable condition.

In every apiary, the empty hives should be weighed and marked, that the quantity of honey they contain when stocked may at any time be easily ascertained, by deducting the weight of the hive from the gross, and allowing for pollen and wax.

THE AMERICAN BEE JOURNAL.

WASHINGTON, SEPTEMBER, 1866.

☞ THE AMERICAN BEE JOURNAL is now published monthly, in the City of Washington, (D. C.,) and all communications should be addressed to the Editor, at that place.

Wintering Bees.

Many years ago, Baron Ehrenfels, the most extensive and enthusiastic bee-keeper of his day—"the man of a thousand hives," as he was popularly called—declared that he only deserved to be called a master in bee culture who could so manage his apiary that his average yearly loss in wintering did not exceed five per cent. of his entire stock. Ever since then the subject of wintering bees has engaged the solicitous attention of thoughtful bee-keepers in every country. Nevertheless, nothing comparatively has been elicited to remove the difficulties, or that can be regarded as giving assurance of success. Dzierzon, who has been longer and more largely conversant than any other man with the practical management of bees, stated at the last German Apiarian Convention, that the wintering of bees was the great remaining unsolved problem in bee culture; and this is corroborated by the fact, that William Günther, the late well-trained and expert bee-keeper of the Baron of Berlepsch, lost nearly the whole of his large apiary in the disastrous winter of 1864 and '65. An attempt, therefore, to trace the causes in which these difficulties originate, cannot but be interesting and useful, though we may still fail to reach the desired result.

In very many, if not a majority of cases, the disaster may undoubtedly be attributed to the want of adequate supplies of food. Inexperienced, oversanguine, or careless bee-keepers undertake to winter colonies, or weak and late swarms, which failed to gather the necessary store of honey, and the bees die literally of starvation. This should not happen more than once in the experience of any. A new beginner may be excused for not knowing how much honey is needed to carry a colony safe through the winter; the winter may prove to be unusually severe and protracted; or the weather the while be so exceedingly variable, as completely to disappoint the prudence of one who never before had occasion to "forecast the fashion of uncertain evils" in bee culture. One lesson, however, on this point, in the school of experience should suffice, and, if wise, he will thenceforward rather err in overprovisioning stocks, that may seem to be in danger of exhausting their stores before the flowers of May again dispense their nectar. He will take care that they shall be furnished with ample supplies in good season; and thus, in all likelihood, rather incur the risk of running into the opposite extreme of "killing with kindness."

But the bees are not unfrequently found dead in the spring, in hives which still contain an abundant supply of honey—enough, indeed, in some instances, to have carried an ordinary colony safe through the winter. The very "staff of life" to them was there in plenty, but excessive cold prevented them from moving forward in cluster to the comb containing it, and they were doomed to die a lingering and cruel death, with the richest stores garnered around them. The fault here is usually the want of winter passages in the combs, through which the bees might pass to reach their food in the lateral combs, when those above them are exhausted. In cottage hives, in which the combs are built straight and parallel to each other and to the sides, they are apt to be defective in this particular, if the comb-building took place at a time when the flowers were yielding honey profusely, and the bees were anxious and in haste to provide all possible storeroom. In such hives, moreover, this faulty construction of the combs is not readily ascertained when they are well stocked with bees. But where it is suspected (and suspicion here is ofttimes wise), it will be prudent to bore an inch hole with an auger, through the hive and broadsides of the combs, near the middle, and then cork shut the holes in the sides of the hive. This should be done lute in October or early in November. In movable comb hives such faulty construction is much more frequent, but it is then more easily ascertained, and a remedy can be more readily applied; though Mr. Langstroth has devised and introduced an ingenious prevention which effectually disposes of this source of danger—and "an ounce of prevention is worth a pound of cure," says the adage.

It is, however, not only indispensable that the supplies be abundant and accessable, but the quality of those supplies is likewise of great importance. Thin, watery honey, gathered late in the season, or derived from late honey dew, or perhaps collected in pine groves, is unsuitable for winter food; and if bees are confined to the use of such honey exclusively, for a prolonged period, it will prove highly deleterious. So also will honey, which though originally in-

nocuous, remained unsealed in the cells till it became slightly acid, or underwent partial fermentation. For winter or spring food, particularly after brooding has commenced, such honey is decidedly bad, as weakening the mature workers and destroying the larvæ fed therewith.

But bees may perish likewise from want of water. This will be the case when the honey in the comb has become candied, or even only greatly inspissated, and there is not sufficient moisture condensed in the hive, while brooding is suspended, for the wants of the bees, which they may lick up and use. But hives may be so badly constructed that condensation does not take place in them, and in such the bees suffer greatly, unless the weather is so moderate, at least at frequent intervals, as to enable them to fly and procure water from out-door sources. Thus they are often seen, even in mid-winter, on mild days, sipping water at pumps, pools, and fountains—a sure indication that they are in great need of it at home. The hive from which they came can be ascertained by sprinkling them with flour, and their wants should be supplied by introducing a piece of wet sponge between the combs, or placing it over their *winterseat*, if the construction of the hive admit of it.

Many colonies, also, perish, or are greatly reduced in population, by dysentery, which usually makes its appearance towards the close of winter or early in spring. At its origin it can scarcely be called a disease, though, under favoring circumstances, it may rapidly spread and soon assume a virulent type. When it occurs late in the winter, it is usually arrested at once, if the weather moderates sufficiently to permit the bees to fly; and the injury resulting, however much to be regretted—for at that season especially the life of every individual worker is precious in the sight of a bee-keeper—is not so serious, as when it attacks a colony in mid-winter, while stress of weather keeps the bees in protracted confinement. Dysentery may be, and in some seasons and districts doubtless is, superinduced by the consumption of deleterious honey, such as has already been referred to. A remedy for this has been found, in several cases, even in the dead of winter, by removing the hive into a warm room and placing over and around it an ample frame-work covered with millinet to keep the bees confined, or a large box having one end made of fine-meshed woven wire. The bees soon came forth, discharged their fæces within the enclosure, and were then liberally fed with pure honey. Thereupon, when the temperature was reduced and the room darkened, the bees re-entered their hive, which was then replaced on its stand. This of course involved some trouble and expense, but it saved the bees.

Hunger, *thirst*, and *dysentery* being the chief causes of the loss of colonies in winter, what should be done by the provident apiarian to guard against damage from them?

In the first place an ample supply of food must be guaranteed. All the hives should be thoroughly examined in September, and to those which have not stores enough to support them, in any event, to the first of May, should at once have the deficiency supplied. In cottage hives this may be done by careful and judicious feeding; and so likewise in movable comb hives, unless a supply of frames containing sealed honey in the combs is on hand and can be inserted. Give them a liberal allowance—a little more than enough will do no harm; and if by feeding give it to them thus early, that they may have time to dispose of it properly and cap that which is not immediately needed. But this is not all. See that your bees can at all times, even in the coldest weather, have ready access to their stores. To this end it is desirable that a large proportion of their supplies be deposited above the place selected by them for their *winterseat*, or that it can subsequently be reached, by easy movement, however low the external temperature may be. They naturally and instinctively place their supplies overhead, and seek for them there when and as needed. Hence they commonly winter better in standard or vertical hives than in flat, shallow, or horizontal ones. With plentiful supplies directly overhead, bees are not likely to suffer, but when the stores are placed laterally in the hive, they may be inaccessible to the bees, in cold weather, unless care be taken to provide winter passages in the combs. Without these the bees may perish in the midst of unavailable abundance.

The next requisite is a supply of moisture or water during winter, for the dilution of thick old honey, and the solution of such as has become candied. Hives containing honey gathered in the preceding summer, are not likely to suffer from want of water, so long as the bees remain inactive and quietly clustered. But when once brooding has actively commenced, the case is materially altered and becomes more critical. Larger and constant supplies of water are then indispensable, and must be at hand or the brood

will suffer. When the bees of some hives in an apiary are observed flying out on cold days in spring, while those of others remain at home, we may reasonably infer that such hazardous excursions in quest of water are made from sheer necessity. A small lump of snow pushed in at the entrance and left to melt there gradually, has in several instances given immediate relief; and a narrow strip of sponge dipped in water and inserted between two combs beneath the cluster of bees, answers well temporarily in cottage hives, and may be resorted to advantageously, when these have no opening at top. Prompt attention is indispensable, as the destruction of brood at this season, from want of water, is a very serious evil, and the loss of mature bees venturing forth to procure it, is one almost equally grievous—for they are of three-fold value at the opening of spring. The condensation of moisture in the hives, if it can be kept within moderate bounds, is of much account in wintering bees, as rendering other supplies of water unnecessary while brooding is suspended. Very warm hives are objectionable on this score, as failing to furnish this condensation, and making the bees altogether dependent for such supplies on external sources. Still, hives in which moisture is condensed as rapidly and profusely as to keep the bees immersed in a humid atmosphere, are equally objectionable. The combs will become mouldy, and the bees, when suffused with moisture, are in perpetual danger of being killed by a degree which would at most temporarily benumb them while dry. Upward ventilation will prevent or remedy this evil, provided a *current* of air be not suffered to pass through the hive; and it seems to be indispensable in movable comb hives. It is, of course, not available in cottage hives, unless caps, close-fitting at the sides, be employed, and these are both troublesome and costly.

But how is dysentery, the scourge that annually decimates so many apiaries, to be prevented? How, in so variable a climate, are we to guard against the vicissitudes of the weather, an insect so peculiarly susceptible of atmospheric changes? We may furnish our hives with ample stores so placed that the bees shall never suffer from hunger, and with such supplies of water that they shall never experience thirst: and yet their intestines may, by long confinement become so overcharged with fæcal matter, that derangement and disease must ensue. The bees of a single colony may, indeed, be relieved by artificial means—enabling them to pass into an antechamber attached to their domicile, but this is scarcely practicable on the extensive scale which a large apiary would require. All that can be effected is to obviate some of the superinducing causes. Well supplied with wholesome honey, housed in comfortable hives, furnished with the needed water, and sheltered from driving winds and extreme cold, bees will generally pass the winter in quiet and health. They will be much aided, too, if the surrounding temperature can be kept moderate and equable, yet low enough to retard the commencement of brooding till the close of March. So long as there is little or no brood in the hive, there will be no excitement among the workers, with a moderate consumption of honey; and the more quiet they can be kept till spring opens, the less liable will they be to contract disease. We refer here exclusively to bees wintered on their summer stands, which is the mode to which most apiarians are restricted. When they can be placed in a cool, dry cellar, they will probably require less attention, consume much less honey, and escape many dangers. Very few bee-keepers, however, have it in their power to use such a repository.

Another important requisite, not only for successful wintering, but for the subsequent prosperity of a colony, is the possession of a young, vigorous, and fertile queen. An old queen is likely to perish in a rigorous winter, or prove to be a mere drone breeder in the spring, if she survive. It is, therefore, advisable to supersede her in the fall, and introduce a young one qualified to pass the trying season, and replenish the population rapidly when genial weather returns. A colony that has a poor queen, a slow layer of worker eggs, obviously desponds and decays, and is ready to succumb under adverse circumstances. A queen of diminished and diminishing vigor should hence be discarded in the fall, unless perchance she be a pure Italian, valuable in other respects, in whose behalf we may venture to incur some risk.

We repeat that for successful wintering a colony should be strong in numbers—having from fifteen to twenty thousand bees at least, and those bred for the most part in autumn or the end of summer. It should have an abundant supply of honey, gathered in the previous season, with a moderate supply of fresh pollen. It should be in a substantial warm hive, whether of wood or straw. The hive should, if possible, have sufficient upward ventilation to prevent an accumulation of condensed moisture; yet not permitting a current of air. While brooding is intermitted bees need very little more water than than they obtain in liquid ho-

ney; and an amount of condensation which produces a humid internal atmosphere, is always an evil, and may prove ruinous on a sudden and great reduction of temperature. The combs, too, should be in good condition—neither very old and black, nor yet quite new. Yellow or orange-colored combs, in which brood has been several times reared, are greatly to be preferred, as being warmer and more comfortable in all respects, than such as have been recently built. If thus wintered, bees are not likely to be attacked by dystentery, unless a very prolonged period of continuous cold weather keep them confined. A few mild, clear days, occurring at intervals of six or eight weeks, would suffice to preserve them in health and vigor, till the return of spring.

ITALIAN BEES.

TESTS OF PURITY.

We intended to append some comments to the translation of the Rev. Mr. Kleine's article relative to the marks of purity of the Italian bees, contained in the July number of the BEE JOURNAL, but were prevented from doing so by the press of other matters claiming attention while preparing to resume the publication of this journal, and which have since continued to engross much of our time.

We designed to say, then, that we do not consider Mr. Kleine's description of the distinctive marks of purity as sufficiently clear and full to entitle them to be regarded as exclusive ultimate tests. This is more particularly so in the case of the drones. We cannot say that we have ever seen Italian drones bearing precisely the marking which Mr. Kleine's article requires. On the contrary, we have seen drones marked differently, which were the progeny of queens undoubtedly pure, if the production of uniformly marked workers (workers fully corresponding in their markings with the standard propounded by Mr. Kleine himself), can be deemed evidence of purity. And we have known queens reared from the worker brood of such a queen, and fertilized by the drones referred to, produce workers marked similarly, and as fully and uniformly so as were the workers produced by the grand-parent; and corresponding too with the worker standard fixed by Mr. Kleine. Hence we are disinclined to receive his description of the marking and coloring of drones and queens, as the standard of purity. We prefer recurring and adhering to the test originally announced by Count Stosch, and recognized everywhere in Germany; namely, that a queen is to be regarded as pure and purely fertilized when young queens, reared from her worker brood and fertilized by her drones, produce workers characterized uniformly by the markings required by the standard for pure workers; and for that worker standard we are willing to accept Mr. Kleine's description. In brief, we would make the markings and deportment of the workers, and not the marking or coloring of either queens or drones the ultimate standard of purity of race. This the rather, because we are not aware that any other recognized authority describes the markings of drones as Mr. Kleine does, in the article referred to; and he himself gives a different description of them in his other publications.

We avail ourselves of the opportunity to add, in reply to frequent inquiries, that we have not been, and are not now, breeding Italian queens for sale, and have no pecuniary interest in any that are so bred.

For the American Bee Journal.

Straining Honey and Wax.

With a shoe-knife cut the comb in strips, if convenient, of three or four inches wide; put them in a porcelain-lined preserving kettle, which set into or on an iron kettle partly full of boiling water. Let it remain on till the combs are melted and a spoon can be passed easily through the mass; but do not stir much if the combs have bee-bread. Then set the kettle with the melted combs on the bottom of the cellar, or in some other secluded place where the bees will not find it, and let it remain until the wax and refuse form a solid cake on the top of the honey. While the honey is still warm, empty all into a bucket made entirely of fine strainer or perforated tin. The one I use is about nine inches in diameter and twelve inches deep, and will hold about as much as a common wooden pail. This strainer bucket (for the sake only of security,) is to be set into a tin bucket of say twelve inches in diameter and sixteen inches deep. Set the inner bucket on a tin hoop about three and a half inches deep, so that the honey will easily strain out. It will be very clear. After the honey is strained out, the refuse can be put into an open hive or box, and let all the bees work on it; or, better still, put it into an empty hive, and set over it some feeble colony. To make honey, put the refuse in a strainer bucket, which set in the other bucket, two thirds full of boiling water, and set it on the stove a few minutes. Now raise the inner bucket out of and over the boiling water, when the wax will, in a few minetes, run out and float on the boiling water, and can be collected in the usual way, by pouring into cold water. I have used these buckets some seven years, and find them more convenient than any other contrivance with which I am acquainted.

Jacksonville, Ill. H. T. COLLINS.

For the American Bee Journal.

I was much pleased to learn that the BEE JOURNAL has been resumed. I have been anxiously waiting for it a long while. I expect a treat every month. It is mentioned on page 11 of the July number, that there is only one instance on record of a *young* queen leading off a first swarm, leaving the old one in possession of the hive. I think that is oftener the case than is generally supposed. I had one instance this summer. An Italian swarm of last year, with the queen's wing clipped, swarmed last July. The queen had been purely impregnated. On opening the hive a few days after, to destroy the queen cells and introduce a pure queen, to my surprise I found plenty of newly laid eggs in the first comb I examined. On looking further I discovered a cell from which a queen had emerged in the natural way, and others, the inmates of which had been destroyed; and finally the identical queen I introduced the year before, with her clipped wing. I killed her and introduced the pure one in a cage which my wife held in her hand at the time. In two days after, when I opened the hive to liberate her, I found her dead, having apparently been stung to death through the meshes of the cage, which were too large. The cage I received from Mr. Langstroth a few days before. This is the only instance of want of success I have had, and I have introduced quite a number. I should have waited a few hours after removing the old one.

I have very poor success in having my Italian queens purely impregnated; not more than one in four, although the Italian drones are the most numerous in my apiary. Either the queens or drones fly to great distances from home; for my drones impregnate my neighbor's black queens, though their apiaries are two and a half miles from mine; and I suppose theirs return the compliment to me. G. SMITH.

For the American Bee Journal.

In Italianizing my stocks, I have found the old queen and a young laying queen, at the same time, in five hives. These hives had not swarmed for three years. One old queen was in a cluster of bees on the bottom board, being worried to death. One in five was renewed at the swarming time. Three were cases of a renewal of young or this year's queens. There seems to have been a perfect mania among the bees to get rid of these old queens, as some of them have done so since killing their drones.

J. M. M.

It is a common practice to rub the inside of a hive with aromatic herbs, a solution of salt, or other substance, with a view of making the hive more acceptable to the expected swarm. But the most experienced and observant bee-masters deem this altogether unnecessary, if not injurious.

The honey harvest, like that of grain and fruit, is early or later, more abundant or scarce, in different years, according to season, and variety of climate or situation.

A HOME IN A SCYTHE SNED.—"The foxes have holes, and the birds of the air have nests," and every living thing which the Almighty has created has a home of some kind, where it may repose its weary head, and find temporary rest from the pursuits by which it lives. A curious instance of this fact was shown some time ago, in Windsor township, this county, which, although simple in its character, is nevertheless singularly characteristic of this truth. Mr. John Menges while mowing with a scythe in the field about a mile from home, was attracted by a continual buzzing or singing of some kind, which he was unable at that time to explain. It continued all the time he was at work, and about the time he had finished, a bee came out of a hole in the sned which he had not discovered before, and flew away. He returned home, and while standing with his scythe in his hand, the buzzing insect which had followed him, and was resolved that it would not be ejected from its habitation, flew up and crept back into the hole which it had left but a short time before. This is a simple fact, but is significant nevertheless, of the care which the Almighty entertains for all living things. The bee still has its home in the scythe sned, now hanging doubtless upon the wall, for who could be so cruel to remove it, or envy it the unobtrusive comforts it enjoys?—*York (Pa.,) Democrat, Sept.* 4, 1866.

Bromwich, an intelligent writer, states that he had three straw hives of bees standing separately in an enclosed shed. These happened to be blown down by a violent wind in the winter. The weather, being very cold, prevented the bees from flying much abroad; but from the position in which they fell, they all accidentally united themselves into one hive, without the loss of a single bee. He immediately raised them on a large flat-toped hive, in order to give them room, which answered the desired purpose beyond expectation. They continued to live in harmony and friendship, and produced next season more than double the usual profit.

We know that both care and expense are required to establish an apiary; but the cost after the first disbursement is trifling. Neatness and vigilance, however, are constantly in requisition; and the care of bees, like any other profitable business, cannot be pursued to advantage, unless it receive daily and minute attention. Why should it be otherwise? Why should we expect our bees to thrive under neglect, any more than our pigs, poultry, sheep, or neat cattle? All the latter require attention, shelter and food—while the bees supply their own provender, and yield a surplus to their owner.

The garden in which an apiary is situated, especially in front and about it, should be well stocked with low shrubs, or espaliers, at a convenient distance, backed, if possible, with taller trees. These are of course requisite to allure the bees at swarming time to settle near home, for convenience of living, instead of wandering off, as they are very apt to do when the coast is clear, nobody knows whither.

From the New York Agriculturist.

Bidwell Brothers' Experience in Bee-Keeping the Past Season.

Our aim in the past season was to get our bees into frame hives, and Italianized, and to secure the largest possible amount of surplus honey.

Advantages of Frame Hives.—In frame hives with straight combs the bees are completely under our control. If one stock is in need of a queen, bees, bee-bread, or honey, it can be supplied from one having an excess, and the condition of both be improved; a large gain can be made in this way. In swarming, a comb from the old hive containing honey and brood can be given to the new swarm, keeping them from flying away and giving them a good start. We are confident that at least one fourth of all natural swarms in this State, usually the largest and best, fly off and are lost. Drone combs may be removed and worker combs given instead, thereby increasing the yield one-fourth.

To avoid the raising of black drones, early last spring we removed the frames, containing drone comb from twenty-five stocks, and twenty which were not used in raising Italian queens, yielded nearly one third more than an equal number with drones. Indeed, all stocks that contain a large proportion of drones, yield comparatively very little, or often nothing. At the commencement of the season we had two hundred and four stocks—ninety-seven of which were in the Langstroth frame hive; sixty-six were in square "Quinby" hives. Early in the spring we made one new swarm out of two old ones, as follows: After driving out the queen with a majority of the bees, we placed them in a frame hive on the stand of the old one, and removed the parent stock to the stand of another stock which was removed to a new place. After twenty days, if the stock last removed had become populous and the season was fair, if it was in a frame hive, we swarmed it, leaving the new one on the stand, placing the old one in place of the one previously swarmed, removing that away. If in a board or straw hive we drove out all the bees for a new stock, and where the combs in the old board or straw hives were straight worker combs, we cut them a trifle larger than the frames and crowded them in and gave them to the new swarm. The balance of the old combs containing honey, we strained by breaking them up and placing them in a willow basket which we set over a barrel and left until all the honey ran out. The usual method of rendering honey by heat ought to be discarded. The scraps of wax we placed in a gunny sack and immersed them in a kettle of water, under which we kept a fire until we thought the wax was all out, when we let the fire go down; and when the wax on top had cooled, we removed it in a solid cake. As soon as the new swarms were full and populous, we placed on our honey boxes, which are tight open bottom boxes, six inches high and wide, and eight inches long, holding when full about ten pounds. Four of these just cover our hives, each of which we place over four one-inch holes two inches apart, on the honey board. If the queen has plenty of room for laying, we remove the honey board and place the boxes on the frames. To enable us to ascertain when the boxes are full, we bore an inch hole in one side of each, over which, inside the box, we place a small bit of glass, secured with tacks. When a box is filled with honey, we invert it and place over it a pane of glass cut to fit, and have a box that will ship to any part of the country, and thus secure the largest price in places where honey is scarcest. When the box is emptied, the purchaser has a box of some practical value for other purposes.

The advantages to the bees are, they can better secure their combs, are not disturbed as in glass boxes by the heat of the day or coolness of the night, will go up into them earlier in the season and remain later. We are satisfied our bees will make much more honey in them than in boxes the sides of which are glass. After our boxes were nearly filled, in the case of populous stocks, we raised up the honey boards with the boxes, under which and over the hive we placed large boxes without top or bottom containing empty frames. In these the largest possible amount of honey can be stored, which will be of the best quality and may be sold in bulk or by the single frame. Having become confident that drones were the great cause of a portion of our stocks refusing to work in boxes, we resolved to remove all the drone combs from our hives, and wishing to remove all our black queens, being satisfied one Italian stock was worth two black ones, we removed all the combs out of every hive, transferring them into clean hives, and also taking away all crooked combs. We thus reduced the number of our stocks from four hundred and one to two hundred and fifty-six, giving each an Italian queen and killing all black queens.

Bees have generally done poorly in our State this season on account of wet weather. Our statement for this year is as follows: At the beginning of the season we had

97	swarms black bees in frame hives @ $12	$1,164
66	" " " board " @ $8	528
41	" " " straw " @ $8	328
204		$2,020
One year's interest at 10 per cent. on value bees		202
" " " " " hives and apparatus		120
		$2,342

At the close of the season the account stands:

7,021	lbs. honey sold in frames @ 25c	$1,755 25
3,117	" " " boxes, composed of dark and unsealed honey @ 23c	761 91
2,980	lbs. on hand in boxes @ 30c	894 00
810	" strained honey, 2d quality @ 22c	178 00
1,419	" " 1st " @ 25c	354 75
15,347	lbs.	$3,899 11
	252 lbs. wax @ 35c	88 20
	256 swarms Italian bees worth	$5,120 00
		$9,107 31
	Deducting above amount	2,342 00
	Leaves profit	$6,865 31

Wax produced by bees foraging on buckwheat blossoms, is always of a superior quality.